Patent Claims:

1. A process for the preparation of optically and chemically highly pure *(R)*- and *(S)*-α-hydroxycarboxylic acids, which comprises recrystallizing impure *(R)*- and *(S)*-α-hydroxycarboxylic acids, prepared by acidic hydrolysis of the *(R)*- and *(S)*-cyanohydrins obtained by enzyme-catalyzed addition of a cyanide group donor to the corresponding aldehydes or ketones, in an aromatic hydrocarbon, optionally in the presence of a cosolvent, and obtaining optically and chemically highly pure *(R)*- and *(S)*-α-hydroxycarboxylic acids having an optical purity of over 98%ee.

2. The process as claimed in claim 1, wherein the impure *(R)*- and *(S)*-α-hydroxycarboxylic acids are prepared by acidic hydrolysis of the *(R)*- and *(S)*-cyanohydrins obtained by enzyme-catalyzed addition of a cyanide group donor to the corresponding optionally substituted aliphatic, aromatic or heteroaromatic aldehydes or ketones.

3. The process as claimed in claim 1, wherein impure, aromatic *(R)*- and *(S)*-α-hydroxycarboxylic acids of the formula $Ar-(CH_2)_nCH(OH)CO_2H$ in which n is 0 or an integer from 1 to 5 and Ar is an aryl or heteroaryl radical which is unsubstituted or mono- or polysubstituted by OH, C_1-C_4-alkyl or -alkoxy, thioalkyl, halogen, optionally substituted phenyl or phenoxy, amino or nitro, are employed.

4. The process as claimed in claim 1, wherein *(R)*-2-chloromandelic acid is employed.

5. The process as claimed in claim 1, wherein the α-hydroxycarboxylic acid to be purified is dissolved in the appropriate solvent with warming, then the solution is slowly cooled to 15 - 50°C and, after a standing time of a few minutes up to a number of hours, the crystallized product is filtered off, and the crystallizate is washed with the same solvent and dried.

6. The process for the preparation of chemically and optically highly pure *(R)*- and *(S)*-α-hydroxycarboxylic acids, which comprises treating the hydrolysis solution obtained by acidic hydrolysis of the *(R)*- and *(S)*-cyanohydrins, prepared by enzyme-catalyzed addition of a cyanide group donor to the corresponding aldehydes or ketones, directly with an aromatic hydrocarbon, optionally in combination with a cosolvent, then extracting the mixture at hydrolysis temperature, whereupon after cooling of the organic phase the corresponding chemically and optically highly pure *(R)*- and *(S)*-α-hydroxycarboxylic acids having an optical purity of over 98%ee crystallize out.

7. The process as claimed in claim 6, wherein chemically and optically highly pure aromatic *(R)*- and *(S)*-α-hydroxycarboxylic acids of the formula $Ar\text{-}(CH_2)_nCH(OH)CO_2H$ in which n is 0 or an integer from 1 to 5 and Ar is an aryl or heteroaryl radical which is unsubstituted or substituted by OH, C_1-C_4-alkyl or -alkoxy, thioalkyl, halogen, optionally substituted phenyl or phenoxy, amino or nitro, are prepared.

8. The process as claimed in claim 1 or 6, wherein toluene, xylene, benzene, ethylbenzene, isopropylbenzene or chlorobenzenes are employed as aromatic hydrocarbons.

9. The process as claimed in claim 1 or 6, wherein the cosolvent employed is a solvent which increases the solubility of the hydroxycarboxylic acid in the organic phase and which is readily separable by distillation, in an amount from 5 to 50% by volume.

10. An optically and chemically highly pure *(R)*- or *(S)*-α-hydroxycarboxylic acid having an optical purity of over 98%ee, prepared by a process as claimed in claim 1 or 6.